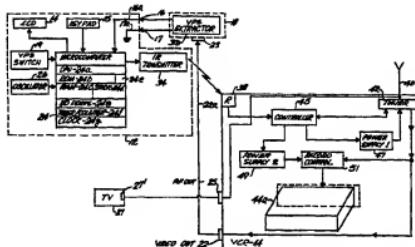




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(54) Title: VPS COMPATIBLE APPARATUS AND METHOD USING COMPRESSED CODES FOR IR CODE SELECTION



## (57) Abstract

An embodiment of the present invention is a method for programming a controller for selection, from a plurality of set of infrared (IR) codes, set of IR codes for subsequent control of IR signal communication with a video cassette recorder (VCR). Each set of IR codes is for communicating with a different corresponding VCR. To this end, each such VCR has a tuner, which, when tuned to an actual channel of broadcast video signals, provides video signals derived from the actual channel to a video output thereof. A signal is provided to the VCR where the signal is predetermined by a selected IR code which is selected from one of the sets of IR codes. This causes the VCR to perform a predetermined operation. The video output of the VCR is monitored for a predetermined signal condition, such as a video signal being present, or for a label broadcast in the video signals. A set of IR codes is then selected for subsequent signal communication with the VCR. The set of IR codes which is selected is the one from which the selected IR code is selected which results in the predetermined signal condition.

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## VPS COMPATIBLE APPARATUS AND METHOD USING COMPRESSED CODES FOR IR CODE SELECTION

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### Field of the Invention

This invention relates generally to video cassette recorder systems and particularly to preprogramming of video cassette recorders (VCRs).

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### Background of the Invention

The disclosure contained in each of U.S. Patent No. 5,307,173 and International Application Publication No. WO 90/07844 (collectively the Prior Applications) is hereby incorporated by reference into the present application. The Prior Applications disclose apparatus and methods for using compressed codes called "G-CODEs" for timer preprogramming of VCRs. A commercial controller for programming VCRs using these codes is called the VCR PLUS+™ programmer and the compressed codes are commercially referred to as PlusCode™ both being trademarks of Gemstar Development Corporation who markets the programmer and codes. Briefly, the G-CODEs are used for simplifying and reducing the chances of errors in the preprogramming of VCRs. Each G-CODE consists of 1 to 8 digits and is associated with the channel, date, time and length of a future television program. A user looks up the G-CODE in a television program guide and enters the G-CODE in programmer instead of separately entering the program channel, date, start time, and length values. Each G-CODE is a result of encoding a set of individual program channel, date, start time, and length values. Each G-CODE is thus compressed in that it has a length that is shorter than the length of the concatenation of the individual program channel, date, start time, and length values.

The encoding of the G-CODEs is done prior to preparation of the television program guide that publishes the codes. For each program that is to be printed in the guide with a G-CODE, the channel, date, time, and length values for the G-CODE are entered in the computer. The computer uses a "priority vector" and a "bit hierarchy key" to assign a number 1 to 8 digits long (i.e., a number between 1 and 99,999,999) based on the statistical popularity of the channel, time and length of each program. Thus, the programs on the more popular channels broadcast at popular times and having common lengths are assigned fewer numbers of digits and programs on less popular channels at less popular times with less popular lengths are assigned higher numbers of digits in their respective G-CODEs. As a result, each G-CODE represent not only the program channel, date, start time, and length values, but also the probability that the program will be selected. Further, details of methods for encoding and decoding the G-CODEs are more fully explained in the Prior Applications.

1        One problem with using G-CODEs to preprogram a VCR controller is that the  
program start time and length values are predetermined in the G-CODEs and cannot be  
changed due to later schedule or transmission time changes. For example, if the actual  
5        transmission of a program is delayed or advanced, or if the length of a program changes (for  
example, when a sport game goes to overtime), a VCR controller preprogrammed with G-  
CODES will not be able to record the desired program in full. The possibility of not  
recording the full program is reduced by allowing the user to manually key into the controller  
in an extension to the length represented by the G-CODE. However, this requires operator  
intervention and the extension may not be enough or the length might be too long overlapping  
10      with another program to be recorded.

Another system exists in Germany that is different from the above G-CODE approach. Television transmitters in Germany have adopted the Video Program System (VPS) guidelines. The first German Television (ARD) and the second German Television (ZDF) currently comply with the VPS guidelines. The detailed specification of the VPS is set forth  
15      in technical guidelines of the Public Broadcast Bureau in the Federal Republic of Germany, Guideline No. 8 R 2, Edition No. 2, 08/87, authored by the Technical Commission ARD/ZDF and published by the Institute for Broadcast Technology (IBT) content of which is hereby incorporated by reference into the present application.

According to the VPS, a user enters into a controller for a VCR information  
20      corresponding to a selected program, including individual program channel, date, predicted start time, and length values from information printed in a television program guide. The VCR's tuner is switched to the actual channel corresponding to the user-entered channel number on the program date, but at a time prior to the scheduled start time. For example, if the user selected a program by entering 2 as the channel number, and the 15th as the date, 25      7:30 p.m. as the start time, and 0.5 hours as the length, the VCR equipped with a VPS extractor would turn on the tuner at 4:30 p.m. on the 15th and switch the tuner to channel 2 (i.e., the tuner is turned on three hours ahead of the predicted start time). According to the VPS, each video program includes a VPS label or code transmitted in data line 16 of the vertical blanking interval (VBI). A VPS extractor or decoder is connected to the tuner.  
30      Coincidence between the start time entered by the user and the start time contained in a VPS code is looked for. Although the actual video program may be transmitted before or after the predicted start time, its VPS code always includes the predicted start time. Thus, the predicted start time information printed in a television program guide matches the start time included in the VPS code. The beginning of transmission of the user-selected program is signalled by the transmission for the first time of a VPS code whose start time equals the predicted start time. As soon as the user-entered start time and the start time included in the broadcast VPS code are identical, the VCR starts recording the program being transmitted. The end and/or the interruption of a program transmission will be signalled and recognized  
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1 by a different start time in a different VPS code. Thus, the user-selected program is  
2 recorded from the very beginning to the very end regardless of shifts in the start time and  
3 changes in the length of the program.

4 Users of VCRs equipped with VPS extractors typically input separate channel, date,  
5 start time, and length values of the selected video program. This preprogramming procedure  
6 suffers from a number of drawbacks. First, the procedure can be complex and confusing and  
7 difficult to remember. Thus, many VCR owners avoid using the preprogramming feature.  
8 Second, user programming errors occur and as a result the recording of the channel, date,  
9 time, and length information to the VCR is often in error. Third, even for experienced  
10 users, the process of entering a lengthy sequence of information on the channel, date, time,  
11 and length of a desired program can be tedious.

12 Thus, there is a need in the art for a system for simplifying VCR preprogramming  
13 using program labels or codes broadcast with or in the program to be recorded in which  
14 users select programs to be recorded using compressed codes representing channel, time, and  
15 length values.

16 Methods and apparatus are known which allow a user of a built-in or remote controller  
17 to select the proper IR codes for controlling a consumer electronic device. By way of  
18 example, one device known as the VCR PLUS+ Programmer, distributed in the United  
19 States by Gemstar Development Corporation, has a stored set of IR codes, one of which is  
20 selected for controlling each particular type of VCR. The various control functions which  
21 each set of IR codes may control include turning on the VCR, turning off the VCR, tuning  
22 the tuner in the VCR to the correct channel, turning on the drive to the tape cassette and  
23 causing a program on the tuned channel to be recorded and turning off the VCR after a  
24 program has been recorded.

25 In that device, the VCR to be controlled is set to channel 3 and then is turned off.  
26 The brand of VCR is located and a number corresponding to that brand is then entered on  
27 a keyboard of the controller. The controller is then pointed at the VCR and an "enter"  
28 button is pressed. The controller then selects a corresponding set of IR codes and, from that  
29 set of IR codes, selects codes which cause the VCR to turn on and IR codes that cause the  
30 tuner to switch to channel 9 and transmits IR signals derived from those codes to the VCR.  
31 If the VCR is turned on and changed to channel 9, then the user presses a "save" button  
32 which then selects the corresponding set of IR codes for future communication with the VCR.  
33 If the VCR does not turn on or turns on but is not changed to channel 9, then the controller  
34 is again pointed at the VCR and the "enter" button is pressed causing the controller to then  
35 select another set of IR codes and repeat the operation discussed above using this new set of  
selected IR codes. This is repeated until the VCR properly turns on and switches to channel  
9, at which time the "save" button on the controller is pressed causing the corresponding set  
of IR codes to be selected for subsequent communication with the VCR.

1        Another problem with using G-CODES relates to mapping between channel numbers  
represented by G-CODES and the actual channels on which a desired program is broadcast.  
Each G-CODE corresponds to a specific G-CODE channel number. However, the channel  
number for the channel on which a user-selected program is transmitted depends on the cable  
5        company or the geographic area of the local transmitter. For example, a FOX program is  
received on channel 11 in Los Angeles as opposed to channel 6 in San Diego. Likewise,  
ABC and NBC programs are received on channel 7 and 4, respectively, Los Angeles as  
opposed to channels 10 and 39, respectively, in San Diego. Thus, although a program  
10      broadcasted on ABC has a single G-CODE listed in the television program guide, the  
program itself is received on two channels with different numbers in Los Angeles and San  
Diego. In many European countries this problem is amplified because typical television  
transmitters in Europe transmit at much lower power than television transmitters in the  
United States. Thus, the "network," such as ZDF, may be broadcast on several different  
15      channels in different areas within a single city causing potential overlap of signals with the  
same channel numbers.

20       To address this problem, the VCR PLUS+ programmer includes a channel map so  
that the user-entered G-CODE is decoded and the proper channel number is used to select  
the proper actual channel on which the user-selected program is received. Channel maps for  
converting a channel name or a channel number known to a user to the proper actual channel  
are generally known in the art. Typically they are created manually and stored in a  
correlation memory table or a re-down loaded from a local remote site into a memory table.  
A need exists for an efficient and accurate way to create a channel map automatically.

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1    **Summary of the Invention**

An embodiment of the present invention is a method for programming a controller for selection, from a plurality of infra red (IR) codes, a set of IR codes for subsequent control of IR signal communication with a video cassette recorder (VCR). Each set of IR codes is for communicating with a different corresponding VCR. To this end, each such VCR has a tuner, which, when tuned to an actual channel of broadcast video signals, provides video signals derived from the actual channel to a video output thereof. A signal is provided to the VCR where the signal is predetermined by a selected IR code which is selected from one of the sets of IR codes. This causes the VCR to perform a predetermined operation. The video output of the VCR is monitored for a predetermined signal condition, such as a video signal being present, or for a label broadcast in the video signals. A set of IR codes is then selected for subsequent signal communication with the VCR. The set of IR codes which is selected is the one from which the selected IR code is selected which results in the predetermined signal condition. With this arrangement, it is possible to automatically determine the proper set of IR codes for communication between a VCR controller and any of a number of VCRs automatically with virtually no user intervention.

20    Embodiments of the invention are a method and controllers for channel mapping. The method and controller are each characterized for using compressed codes for enabling a channel tuner to select the proper one of plural actual channels and for controlling a recorder to record programs broadcast over such channel. Programs and associated program information labels are broadcast at various times. Each compressed code incorporates the data represented by a set of individual channel number, start time, and program length values. Each compressed code has a length that is shorter than the length of the concatenation of the individual channel number, start time, and program length values represented by the individual compressed codes. The controller forms a correlation, and thereby a channel map, between the channel number represented by each compressed code and the actual channel to be selected by the controller for recording. To this end, the controller includes an actual channel number generator for forming a plurality of actual channel numbers, each corresponding to one of the actual channels. An actual channel selector enables selection by the tuner of the actual channels which correspond to the formed channel numbers. A processor compares, for a predetermined relation, at least a portion of the broadcast program information label from each selected channel from the tuner with a plurality of given labels. Each given program label has a different corresponding compressed code channel number. A correlation is formed and stored in a memory giving the correlation between each of the compressed code channel numbers, which has a corresponding given program label, and the actual channel number for an enabled actual channel from which one of the broadcast program information labels is obtained. This is done when the predetermined relation is found between the given program label and the program

1 information label. With this arrangement a correlation or memory map is automatically  
5 created correlating the channel number values from the compressed codes with the actual  
channel numbers of the actual channels.

Preferably, the program information labels are extracted from the broadcast programs.  
5 Also, preferably, the program information labels are extracted from the vertical blanking  
interval of the broadcast television signals. In the preferred embodiment, the broadcast  
information labels include channel names and the given program labels include channel names  
and the comparison is made between these names.

10 Another embodiment of the present invention is a controller for enabling a channel  
selector to select the proper channels and for control a recorder to record programs broadcast  
on such channels where the programs and associated program information labels are  
15 broadcast at various times over a plurality of broadcast channels. The controller includes and  
input for receiving compressed codes. Each compressed code incorporates the data  
represented in a set of individual channel, start time, and program length values. Each of  
the compressed codes has a length that is shorter than the length of the concatenation of the  
20 individual channel, start time, and program length values represented by the compressed  
code. A decoder expands the received compressed codes into at least individual channel and  
start time values. The channel selector is enabled to select the broadcast program from the  
channel which corresponds to the individual channel value which is from one of the  
25 compressed codes. A determination is made of whether a predetermined relation exists  
between at least one value represented by one of the received compressed codes and at least  
a portion of one of the broadcast program information labels. Operative upon such  
determination, either the recorder is enabled for recording to thereby cause recording of a  
30 selected broadcasted program or the recorder is deactivated to thereby cause termination of  
the recording of one of the selected broadcasted programs. With this manner, built in or  
remote controllers for recorders can be programmed using compressed codes so as to start  
recording or terminate recording where the program starts early or ends late.

Preferably, the compressed codes are one or more alpha numeric characters.  
Preferably, the compressed codes are input through a keyboard. In one embodiment, the  
30 controller is separate from the recorder and in another embodiment, the controller is a part  
of the recorder.

Preferably, the program information label is extracted from the broadcast programs.  
The program information labels are preferably extracted from the vertical blanking interval  
of broadcast television signals.

**1      Brief Description of the Drawings**

FIG. 1 is a front perspective view of a controller for inputting G-CODEs and receiving video programs with associated VPS codes for activating and deactivating a VCR and embodies the present invention;

5      FIG. 2 is a rear view of the controller shown in FIG. 1;

FIG. 3 is a schematic and block diagram of a system including the controller of FIG. 1 and a VCR;

10     FIG. 3a is a schematic and block diagram illustrating the electrical inter-connection and signal coupling between a VCR, a TV, a controller and a VPS decoder chip, and embodies the present invention;

FIG. 4 is a flow diagram illustrating operation of the controller in FIG. 1;

FIGs. 5a and 5b depict the format of the VPS code broadcast during the vertical blanking interval of television signals;

15     FIG. 6 depicts words 11-14 of the broadcast VPS code containing the channel, date, and start time values used by the various embodiments of the invention;

FIG. 7 is a schematic and block diagram of another embodiment of the invention in which the controller is contained within a VCR;

FIG. 8 is a flow diagram illustrating a method embodying the invention for compiling a channel correlation table for channel mapping;

20     FIG. 9 depicts a channel correlation table used for channel mapping with the controller of FIG. 1 and the system of FIG. 7;

FIG. 10 is a flow diagram illustrating the operation of the systems of FIG. 3 for automatic selection of IR codes for the VCR; and

FIG. 11 is a block diagram of an alternate base unit.

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1      **Detailed Description**

5      FIG. 1 depicts a remote control or programmer 10 including hand-held unit or controller 12 mounted on base unit 18. Electrical pins 16 and 17 in base unit 18 provide removable electrical connections to contacts 16a and 17a, respectively, in hand-held unit 12 for signal communication. Pin 17 is connected to a common ground in the controller and the base unit. Key pad 15 forms an inputting means to enter the G-CODEs corresponding to user selected programs. Display 14 is a conventional liquid crystal display used for displaying and verifying user inputs and communicating messages from a microcomputer (see FIG. 3) to the user. The rear 20 of base unit 18, shown in FIG. 2, has an RCA-type jack 23 which forms means for receiving broadcasted programs from the "VIDEO OUT" of a conventional VCR.

10     The VCR is a conventional VCR in which the VIDEO OUT (video output) 22 is a conventional RCA-type jack connected to tuner 42 of the VCR and RF OUT 25 is a jack connected directly to the video or antenna input to the VCR going to the tuner 42. In this manner broadcast video signals input to the VCR are always passed from the input of the VCR to RF OUT 25 to TV 27 whether or not the VCR and tuner are turned on and video signals from the actual channel selected by tuner 42 from the input video signals are passed to VIDEO OUT 22 and from there over cable 22a to base unit 18 of remote control 10 when the tuner is turned on.

15     FIG. 3 is a schematic and block diagram illustrating the details of a system including the hand-held unit 12 and base unit 18, and a conventional VCR 44, the latter forming a recorder. Hand-held unit 12, keypad 15 for inputting compressed codes, LCD 14, and VPS switch 19 of FIG. 1 are depicted. Oscillator 26 provides regular reoccurring sinusoidal waves for generation of clock signals (not shown) used by microcomputer 24. Microcomputer 24 includes a central processing unit (CPU) 24a, read only memory (ROM) 24b, random access memory (RAM) 24c, stack memory 24d in the RAM, I/O ports 24e, timer/counter 24f and time of day clock generator 24g. Time of day clock generator 24g is preferably a programmed clock in the microcomputer to provide the time of day signals required to decode the G-CODEs and to turn on and turn off the VCR at the correct time. In a preferred embodiment microcomputer 24 is a NEC 7530  $\mu$ PDX microcomputer which can interface directly with LCD 14, keypad 15, VPS switch 19, oscillator 26, and IR transmitter 34. Infra red (IR) transmitter 34 is driven by microcomputer 24 and transmits IR codes, represented by the signals from microcomputer 24, to VCR 44. IR transmitter 34 includes, by way of example, Litton 2871C IR diodes.

20     Referring to base unit 18, VPS extractor 32 detects, extracts and decodes the VPS codes or program information labels, from the television signals for programs received by VCR 44, and transmits the decoded VPS codes in digital form to microcomputer 24 through

1 pins 16 and 17 (FIG. 1). VPS extractor 32 is preferably an integrated circuit chip and is, by way of example, a Siemens SAA 4700 VPS extractor.

5 VCR 44 is a conventional video cassette recorder that is controlled by IR signals for recording on a tape cassette 44a broadcasted video signals received through antenna 40. The TV signals for the video programs are received and selected by tuner 42 and are transmitted to VPS extractor 32 over cable 22a through VIDEO OUT 22. IR receiver 38 receives IR signals from hand-held unit 12. Controller 45 receives control signals or commands from microcomputer 24 through IR receiver 38. Controller 45 enables power from supplies 47 and 49 to tuner 42 and record control 51, respectively. Controller 45 also switches the 10 frequency or channel of TV signals selected and provided by tuner 42. Record control 51 starts and stops recording the programs received by tuner 42 when power from power supply 49 is respectively enabled and disabled.

15 Consider the operation of remote control 10 with reference to FIGS. 1, 3 and 4 and the following examples. The user begins by looking up, in a television program guide, the G-CODE (not shown) corresponding to a selected program and proceeds by serially entering the decimal digits of the G-CODE into hand-held unit 12 using keys 0 through 9 followed by pushing entry key 21 of alphanumeric keypad 15. The user may repeat this process for each G-CODE corresponding to each additional selected program.

20 As soon as each desired G-CODE is entered by pressing the entry key, the code is decoded and expanded by microcomputer 24 into individual program channel, date, start time, and length values according to a decoding program stored in ROM 24b of microcomputer 24 (step 60). The decoding process is the reverse of the encoding process discussed above. Both the decoding and encoding processes are explained in detail in the Prior Applications.

25 Assume that the user enters "1138" as the G-CODE corresponding to a first selected program and a second G-CODE "265" corresponding to a second selected program. These G-CODEs are stored in RAM 24c of microcomputer 24 as soon as they are entered by the user. By executing the decoding program stored in ROM 24b, CPU 24a of microcomputer 24 determines the individual channel, date, start time, and length values corresponding to each of these codes. For example, the G-CODE 1138 corresponds to a program that is scheduled to be broadcasted on channel 4, on the 15th of a particular month, at 7:30 pm, and with a length of 30 minutes. G-CODE 265 corresponds to a program that is scheduled to be broadcasted on channel 7, on the 15th of the month, at 6:30 pm, and with a length of 30 minutes. Microcomputer 24 stores the decoded channel, date, start time, and length values of the user-selected programs for each G-CODE in a separate memory location of stack 24d of RAM 24c. The program values corresponding to the G-CODEs are arranged from top to bottom of the stack 24d one after the other in order of the decoded start times, going from

1 the earliest to the latest date and start time. The program values for the G-CODE with the earliest date and start time are always at the top of the stack.

5 Using the values for the program at the top of the stack, microcomputer 24 turns on tuner 42 a predetermined amount of time, such as three hours, but preferably at least 5 minutes, prior to the time indicated by the start time value to ensure that programs that are advanced in transmission time are properly recorded (step 64). Microcomputer 24 accomplishes this by commanding IR transmitter 34 to transmit power on IR signals to IR receiver 38 of VCR 44. Controller 45 receives the signals from IR receiver 38 and enables or applies power from supply 47 to tuner 42 turning on the VCR. Referring to the example, 10 for the case of the G-CODE 265, microcomputer 24 enables power to tuner 42 on the 15th at 6:25 pm. Thereafter, microcomputer 24 commands IR transmitter 34 to transmit channel select IR signals to VCR 44 corresponding to the channel value in the top of the stack causing controller 45 to switch tuner 42 to channel 7 (step 66). At this point, the VCR is tuned to program channel 7 five minutes prior to transmission of the user-selected program 15 and is providing the television signals for channel 7 to VPS extractor 32.

20 VPS extractor 32 receives and separates the program information labels or VPS signals in the vertical blanking interval of the television signals depicted in FIGs. 5a and 5b, decodes them into digital form compatible for microcomputer 24. The decoded signals are coupled over pins 16 and 17 directly or through individual buffer circuits (not shown) to the I/O ports 24e to the microcomputer 24 (step 68).

25 Fourteen words make up the decoded VPS code as depicted by the VPS word format of FIG. 5b. Words 11-14 comprise 32 bits of data. These 32 bits are shown in FIG. 6 and are arranged as follows. Bits 2 to 6 identify the scheduled transmission day for the video program, bits 7 to 10 identify the scheduled transmission month, bits 11 to 15 identify the scheduled transmission hour, bits 16 to 21 identify the scheduled transmission minute, bits 22 to 25 identify the scheduled transmission geographic area (for example, the state or country to which the program is transmitted), and bits 26 to 31 identify the channel name on which the program is transmitted. Thus, in accordance with the VPS, six groups of data, 30 represented in bits 0 to 31 of words 11 to 14 in the VPS code, contain the program channel, date, and start time information.

35 These 32 bits of data are continually transmitted in each VPS code. Microcomputer 24 isolates bits 2-6, 7-10, 11-15, 16-21, and 26-31 which respectively identify the scheduled transmission day, month, hour, minute, and channel name. VPS switch 19 when set (step 70), causes microcomputer 24 to continuously compare, for equality (i.e., a predetermined relation) the start time indicated by bits 11-21 and the start time of the program values at the top of the stack, which in the example is 6:30 p.m. Thus, microcomputer 24 transmits a command via IR transmitter 34 to VCR 44 causing record control 51 to enable power to a drive (not shown) for tape cassette 44a and enable or begin recording the program on tape

1 cassette 44a. This occurs as soon as the start time indicated by the decoded VPS code matches or equals the start time value at the top of the stack 24d (step 72). The broadcast signals in the channel selected by tuner 42 are then recorded using a record head and circuitry not shown but well known in the art.

5 The same VPS code identifying the same start time is transmitted in the vertical blanking interval of the broadcast program until the program is over. When the program is over the next program includes a new VPS code with a different start time. When the VPS start time changes, microcomputer 24 recognizes the new start time by detecting the difference from the start time value at the top of stack 24d and enables or commands VCR 44 via IR transmitter 34 to disable or stop recording (step 78). As a result controller 45 10 causes power to be removed from tuner 42 and 49 from the drive for tape cassette 44a, thus terminating recording in cassette 44a. Therefore, if the program being recorded is extended beyond the scheduled program length, for example in the case of an overtime in a sport game, the start time contained in the VPS code for that program will continue to match the 15 start time indicated by the G-CODE until the program ends and as such the program will be recorded in its entirety.

When the recording of a program ends (step 78), microcomputer 24 pops up to the top of the stack, the decoded values in the location next to the top of the stack with the G-CODE having the next earlier start time (step 86) and the recording process is repeated in 20 the manner explained above for the program values at the top of the stack (steps 64 at sequence).

If the user decides to start recording a selected program solely based on the start time 25 included in the G-CODE, VPS switch 19 is not set by the user (step 70). In that case microcomputer 24 will send IR signals to activate VCR 44 to begin recording precisely at the start time represented by the start time value at the top of the stack regardless of the start time indicated by the VPS code (step 74). To this end, controller 45 enables power to the drive for the tape cassette 44a, causing the program with the start time at the top of the stack to be recorded. However, microcomputer 24 will continually check and compare the start 30 time in each VPS code received from VPS extractor 32 (step 76) with the start time in the values at the top of the stack so that when a VPS code is present (step 80) whose start time does not match the start time value at the top of the stack, microcomputer 24 will command controller 45 to stop recording as is discussed above (step 78). If microcomputer 24 never receives a VPS code with a matching start time (step 80), microcomputer 24 will command controller 45 in VCR 44 to stop recording after an elapsed time equal to the program length 35 value at the top of the stack (steps 82 and 88) following which the stack is popped up and step 64 is repeated. Thus, the system will work even if VPS codes are not present.

Another embodiment of the invention is shown in FIG. 7. In FIG. 7, remote control 10 is replaced by a conventional VCR remote control 39 except that it is capable of

1 transmitting the G-CODE via IR signals to the VCR for decoding and expanding to individual  
channel, date, start time, and length values and for storage in a stack. Remote control 39  
simply transmits user-entered information via IR signals to VCR 44' from a remote location.  
All of the components of remote control 10 of FIG. 1, with the exception of IR transmitter  
5 34, keypad 15, and display 14 are embedded in VCR 44'. Thus, VPS extractor 32', VPS  
switch 19', oscillator 26', and microcomputer 24' are all housed within VCR 44'. This  
embodiment of the invention uses essentially the same elements operating in essentially the  
same way as described for and depicted in FIGs. 1-3 and illustrate similar elements by the  
same reference numerals with a prime in FIG. 7. The functions performed by remote control  
10 are now performed by G-CODE compatible VPS decoder 48' located in the VCR.

15 Although in describing the above embodiments of the invention references were made  
to "broadcast" programs, this term is used to include programs transmitted through cables  
or over the air from satellite or a local TV station. As such, tuner 42 may receive video  
signals having VPS codes through a satellite receiver or a cable box as well as antenna 40.  
Further, tuner 42 may be included inside the cable box or the satellite receiver instead of  
VCR 44. Further, in the embodiment of the invention shown in FIG. 3, VPS extractor 32  
20 may be housed inside VCR 44 in which case microcomputer 24 receives the extracted VPS  
codes directly or via IR codes from an output of VCR 44. Further, VPS extractor 32 can  
be designed to extract codes such as VPS transmitted not only in the vertical blanking  
interval but also in the video picture portion of television programs. Moreover, a teletext  
decoder such as a Siemens SDA 5231 can be used instead of the VPS extractor in order to  
extract program related codes transmitted in teletext form. In another embodiment, the  
invention is adapted to recording audio programs (with no accompanying video program)  
25 which are transmitted with codes identifying their respective program start times. Thus, the  
various embodiments of the invention are adaptable for use in any audio or video  
programming system where transmitters transmit a program information label including a  
program start time along with the program being transmitted.

30 Other arrangements are possible. For example, a delay of the TV program indicated  
by the values in the top of the stack may cause the program corresponding to the values in  
the next location of the stack to occur first. In one embodiment of the invention, the  
microcomputer will cause the tuner of the VCR to turn on as discussed above and scan the  
extracted VPS labels for a start time matching the start time value for either of the top two  
locations of the stack. This would, by way of example, be done by causing the  
microcomputer to alternatively switch the VCR tuner back and forth between channels for  
35 the channel values in the top two locations of the stack and scan for the VPS label with a  
start time matching the start time value in either of the top two locations of the stack in each  
of successive five minute intervals or more often. If a match is found between the start time  
of a VPS label and the start time value in the top of the stack, then the microprocessor, as

1 discussed above, causes recording and termination of recording of the program broadcast in  
the channel specified by the channel value in the top of the stack. If on the other hand, a  
5 match is formed between the start time of a VPS label and the start time in the location next  
to the top of the stack, then the microprocessor will cause the value in the location next to  
the top of the stack to be popped up to the top of the stack and, as discussed above, used for  
recording and termination of recording of the program from the channel specified in the  
channel value moved to the top of the stack.

10 Alternatively, the microcomputer causes the VCR tuner to switch on a predetermined  
amount of time before the time indicated by the start time value at the top of the stack, select  
the channel corresponding to the channel value at the top of the stack and monitor the TV  
signals from the selected channel. If the VPS label with a matching start time is not found,  
15 the VCR tuner is turned off and the scanning is terminated after a predetermined amount of  
time, i.e., three hours after the time indicated by the start time in the top of the stack. The  
scanning for the program indicated at the top of the stack could also be terminated five  
minutes before the start time value for the next location in the stack and the stacks would  
20 then be popped up. The microcomputer then causes the VCR tuner to select the actual  
channel corresponding to the channel value now in the top of the stack. The microprocessor  
then starts scanning VPS labels for one with a start time matching the start time value in the  
top of the stack and causes the VCR to start recording when that VPS label is located. In  
this manner, the program for prior value in the top of the stack is skipped.

Other methods and arrangements are possible for comparing information carried in  
the G-CODEs and the VPS codes. Thus, one or more additional values derived from the G-  
CODEs could be compared with corresponding values from the VPS code.

#### CHANNEL MAPPING

25 FIGS. 1-3 in conjunction with FIG. 8 illustrate another embodiment of the invention  
for channel mapping. In this embodiment, the VPS codes received by remote control 10 are  
used to create a channel map or correlation Table 110 in RAM 24c which is used for  
selection of the proper actual channels using the channel number values from the compressed  
30 G-CODEs. If a station, i.e., ABC, transmits VPS codes as a part of its video signals, the  
broadcast channel name, i.e., ABC, will be indicated by bits 26-31. The extracted broadcast  
channel names, i.e., ABC, can be used to compile a channel correlation table for proper  
channel mapping or set up of remote control 10 as explained below.

35 Hand-held controller 12 is adapted for channel mapping creating the correlation Table  
110 in RAM 24c and for causing the correct actual channel number (and channel) to be  
selected for a given channel name and G-CODE channel number using a correlation  
Table 110.

To this end, the channel number for each G-CODE is initially assigned the name of  
the desired program as depicted in the columns labeled "NAME" and "G-CODE Channel

1 No" by pre-storing them in the Table 110 of RAM 24c depicted in FIG. 9. Each channel  
5 name, such as ABC, may correspond to one actual frequency or channel number in one  
geographical area or in one cable system, but a different frequency and channel number in  
a different geographical area or in a different cable system. Hand-held controller 12 is  
arranged to automatically complete or create a correlation between each G-CODE channel  
number and complete table 110 in RAM 24c by determining and storing the actual channel  
number in the row for the correspondence G-CODE channel number.

10 FIG. 8 is a flow chart depicting the operation of the hand-held unit 12 for  
automatically creating the correlation Table 110. The hand-held unit 12 is inserted in base  
15 unit 18 and video button 23 is pressed. Microcomputer 24 then begins by randomly selecting  
an actual channel number, such as channel 10 (step 92), and sends a signal to the VCR  
causing tuner 42 to switch to the corresponding actual channel or frequency of TV signals  
step 92). Microcomputer 24 then receives the decoded VPS codes from the selected channel  
of TV signals (steps 94, 96) and isolates bits 26-31 containing the broadcast channel name.  
20 Microcomputer 24 compares the name from the extracted VPS code with the names in the  
table (steps 98 and 100) and when equality is detected with one of the names, stores the  
actual channel number in the corresponding row of Table 110 (steps 100 and 102) in  
association with the corresponding G-CODE channel number. This operation is repeated by  
pressing the video button again selecting a different actual channel number and channel of  
25 TV signal until all desired rows of Table 110 are filled in with an actual channel number  
(steps 94, 96 and 98). For example, ABC, G-CODE channel 7, is assigned actual channel  
number 10 and NBC, G-CODE channel 4, is assigned actual channel number 39. Only a few  
of the rows of Table 110 are shown in FIG. 9 by way of example, but it is understood that  
additional rows for all desired G-CODE channel number values and actual channels will be  
completed in the manner discussed above.

30 The correlation Table 110 depicted in FIG. 9 is then used by the microcomputer in  
the hand-held controller for selecting the proper actual channels during subsequent operation.  
To this end, each time the channel number value for a G-CODE is used to select a program  
for recording, as discussed above, the G-CODE channel value in Table 110 contained in  
RAM 24c is inspected to select the corresponding actual channel number in the same row.  
The selected actual channel number is then sent to the VCR causing the program broadcast  
over the corresponding actual channel to be selected and recorded as discussed above. By  
way of example, G-CODE channel values 7 and 4 would cause programs for actual channel  
numbers 10 and 39 to be selected for recording in VCR 44.

35 The channel correlation table described above can be compiled using other  
embodiments of the invention, such as the embodiment shown in FIG. 7, or the embodiment  
in which the broadcast channel name is extracted by a teletext decoder.

1      **IR CODE SELECTION**

5      The hand-held controller 12 also automatically determines the proper protocol required for communication with the type of VCR with which it is communicating. Each type of VCR has its own corresponding set of pre-stored protocols to allow proper communication via IR signals.

10     To this end, ROM 24b of the hand-held controller in FIG. 3 has a memory Table 24e where a set of IR codes are stored for determining the timing, sequence and coding of signals to be sent to each type of VCR for turning on the VCR, selecting the proper channel in the tuner of the VCR, causing the VCR to start driving the tape cassette for recording and to cause the drive and recording to terminate. One set of protocols is stored for each different VCR or other device with which the hand-held controller may communicate. The correct set of protocols for the particular VCR are found in the table and once selected, are used for subsequent communication using IR signals.

15     The hand-held controller in cooperation with base unit 18 are arranged using the standard VIDEO OUT or video output connector 22 provided in most VCRs to automatically determine when the correct set of protocols for the VCR have been located.

20     FIG. 10 is a flow diagram illustrating the sequence of operation of the hand-held controller and base unit of FIG. 3 for automatically determining and selecting the proper set of IR codes stored in Table 24e. Initially, the hand-held controller 12 is inserted into base 18 and the enter button 25 on the keyboard is pressed to cause the automatic set up operation to start at blocks 200 and 202 of the flow. During block 204 the hand-held controller and base unit 18 determine whether a video signal is present on cable 22a from VIDEO OUT connector 22.

25     The presence of video signals on the VIDEO OUT connector 22 is detected as follows. If during the operation in block 204 the microprocessor detects that a video signal is not present from VIDEO OUT connector 22, it is known that the VCR is initially turned off, and the block 206 is entered where a coded signal is obtained from one of the sets of IR codes in Table 24e telling how to turn the corresponding VCR on for that set of IR codes. During block 208 the appropriate VCR turn on IR signals are transmitted via transmitter 34 to VCR 44. During block 210 the microcomputer 24 determines whether a video signal at VIDEO OUT connector 22 is present. If a video signal is present then it is known that the correct set of IR codes for the VCR have been located and blocks 212 and 216 are entered where a corresponding set of IR codes are selected for subsequent control of the VCR, as discussed above, and the operation is terminated at block 218. If during block 210 the microcomputer 24 does not detect that a video signal is present from VIDEO OUT connector 22, then blocks 212 and 214 are entered where another one of the sets of IR codes for another VCR is selected and block 208 is reentered where the turn on signals for the newly selected set of IR codes are transmitted in an endeavor to turn on the VCR in the same

1 manner discussed above. The operation of blocks 208-214 are repeated until the  
5 microcomputer detects a video signal from the VIDEO OUT connector 22 in which case  
blocks 212, 216 and 218 are entered from block 212 as discussed above.

10 The operation at the right side of FIG. 10 is similar to that at the left side, except that  
5 it is for a situation where the VCR is initially turned on. If during block 204 the  
microprocessor detects a signal from VIDEO OUT connector 22 blocks 206a and 208a are  
15 entered where a set of IR codes for one type of VCR is selected from Table 24e and the turn  
off signals from the selected set of IR codes are transmitted to the VCR attempting to turn  
the VCR off. During blocks 210a and 212a the microcomputer detects if a video signal is  
20 received from the VIDEO OUT connector 22 and, if not, it is unknown that the correct set  
of IR codes from Table 24e have been selected and blocks 216 and 218 are entered where  
the corresponding set of IR codes from Table 24e is selected for future use in operating the  
25 hand-held controller. If during block 212a the microcomputer detects that a video signal is  
still present at the VIDEO OUT connector 22, block 214a is entered where the next set of  
IR codes is selected from Table 24e. The signals for turning off the VCR from the selected  
set of IR codes is transmitted during block 208a to the VCR following which blocks 210a and  
30 212a are entered as discussed above.

35 The presence of video signals from VIDEO OUT connector 22 may be detected by  
the microcomputer in a number of different ways. One way in which this may be done is  
20 to add a sensor or detector, such as 220 as in FIG. 11, which senses whether a video signal  
is present on cable 22a connected to the VIDEO OUT connector 22 and forms a special  
coded signal through pins 16 and 17 to the microcomputer.

40 Another way in which this may be done is by having the microcomputer programmed  
to transmit an actual channel select signal, via transmitter 34, to VCR 44 causing the tuner  
42 to switch to the selected actual channel and causing a VPS label from the corresponding  
25 program to be extracted by the VPS detector 32. The microcomputer is programmed to  
compare a given known VPS label with extracted VPS labels from the selected actual  
channel. When equality is detected it is known that the tuner, and hence the VCR 44, has  
been turned on.

45 Another approach would be for the microcomputer to cause the transmitter 34 to  
transmit a sequence of different actual channel select signals causing the tuner 42 to switch  
to the corresponding actual channels in sequence. The microcomputer is programmed in this  
example to monitor the extracted VPS signals until any VPS label is detected as being  
50 present. If any VPS label is detected it is assumed that the VCR is turned on. If no VPS  
labels are detected, then it is assumed that the VCR is not on.

55 Although the automatic selection of IR codes has been described with reference to  
control of a VCR, such as that depicted in FIG. 3, automatic selection of IR codes may be  
employed for other types of consumer electronic devices, such as washers, dryers, automatic

1       thermostat control devices etc. In each of these devices a feedback would be provided from  
the consumer electronic device to the controller which is selecting the codes to indicate when  
the device has been properly turned on or turned off or otherwise properly activated,  
following which the corresponding set of IR codes would be used for controlling the  
5       consumer electronic device.

10      The apparatus and methods of the present invention and their intended advantages will  
be understood from the foregoing description and it will be apparent that various changes  
may be made in the form, construction and arrangement of the parts thereof without  
departing from the spirit and scope of the invention or sacrificing all of its material  
advantages, the forms hereinbefore described being merely exemplary embodiments thereof.

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1      **WHAT IS CLAIMED IS:**

1.      A method for programming a controller for selection, from a plurality of sets of infra red (IR) codes where each set is for communicating with a different video cassette recorder (VCR), one of such sets of IR codes for subsequent control of IR signal communication with the corresponding VCR, and

5                wherein each such VCR has a tuner, which when tuned to an actual channel of broadcast video signals, provides video signals derived from such actual channel to a video output thereof, the method comprising the steps of:

10                providing to such a VCR a signal predetermined by a selected IR code which is selected from one of the sets of IR codes to cause the VCR to perform a predetermined operation;

15                monitoring the video output of the VCR for a predetermined signal condition; and

20                selecting the set of IR codes, from which the selected IR code is selected which results in the predetermined signal condition, for subsequent signal communication with the VCR.

25      2.      The method of claim 1 wherein the step of monitoring monitors for a video signal from the video output.

30      3.      The method of claim 1 comprising the step of tuning the tuner to a predetermined actual channel over which a predetermined program label is expected to be received and provided to the video output of the VCR, and wherein the step of monitoring comprises the step of comparing at least a portion of a given program label with the program information label provided over the video output for a predetermined relation.

35      4.      The method of claim 3 comprising the step of repeating the steps of tuning and comparing using a different actual channel and a different given program label.

40      5.      The method of claim 1 comprising the step of tuning the tuner to a predetermined actual channel prior to the step of monitoring.

45      6.      The method of claim 3 comprising the step of repeating the steps after tuning the tuner to a different channel.

50      7.      A controller for selection from a plurality of sets of infra red (IR) codes, where each IR code set is for communicating with a different corresponding video cassette

1 recorder (VCR), one said set of IR codes for subsequent control of IR signal communication with the corresponding VCR, and  
wherein each such VCR has a tuner which, when tuned to an actual channel of broadcast video signals, provides video signals derived from such actual channel to a video output thereof,

5 the controller comprising:  
a code selector for providing to such a VCR a signal predetermined by a selected IR code which is selected from one of the sets of IR codes for causing the VCR to perform a predetermined operation;

10 a monitor for monitoring the video output of the VCR for a predetermined signal condition; and  
a selector for selecting the set of IR codes, from which the selected IR code is selected which results in the predetermined signal condition, for subsequent signal communication with the VCR.

15 8. The controller of claim 7 wherein the monitor monitors for a video signal from the video output.

9. The controller of claim 7 comprising  
20 means for tuning the tuner to a predetermined actual channel over which a predetermined program label is expected to be received and provided to the video output of the VCR, and  
wherein the monitor compares at least a portion of a given program label with the program information label provided over the video output for a predetermined relation.

25 10. The controller of claim 9 wherein the means for tuning is operative for tuning to a different actual channel and the monitor is operative for comparing using a different given program label.

30 11. The controller of claim 7 comprising means for tuning the tuner to a predetermined actual channel prior for monitoring.

12. The controller of claim 9 wherein the means for tuning tunes the tuner to a sequence of different channels.

35 13. A video system comprising  
a video cassette recorder (VCR) having a tuner for receiving video signals, a video output (VO) for receipt of video signals selected by the tuner when turned on, a radio

1 frequency (RF) output for providing to an external device the video signals received by the tuner whether or not the tuner is turned on and an infra red (IR) receiver for receiving control signals for control of the VCR from a remote controller; and  
5 a video cassette controller electrically connected to the VO for receiving video signals when the tuner is turned on, and comprising an IR transmitter for transmitting IR control signals to the receiver for control of the VCR.

10 14. In a method for channel mapping a controller which uses compressed codes for enabling a channel tuner to select the proper one of plural actual channels and for control of a recorder to record programs broadcast over such channels, where the broadcast programs and associated program information labels are broadcast at various times, and  
15 wherein each compressed code incorporates the data represented in a set of individual channel, start time, and program length values, wherein the compressed code has a length that is shorter than the length of the concatenation of the individual channel, start time, and program length values represented by the individual compressed codes,

20 the method of channel mapping forming a correlation between the channel number represented by each said compressed code and the number of the actual channel for the tuner to be enabled by the controller for such channel number, the method comprising the steps of

25 forming a plurality of actual channel numbers each corresponding to one of the actual channels, for thereby enabling selection by the tuner of the actual channels, which correspond to the formed channel numbers;

30 comparing, for a predetermined relation, at least a portion of the broadcast program information label from each of such selected channels from the tuner with plural given program labels, each said given program label having a different corresponding said compressed code channel number; and

35 storing in a memory a correlation between each said compressed code channel number, having a corresponding said given program label, and the actual channel number for an enabled actual channel from which one said broadcast program information label is obtained when the predetermined relation is found between the last mentioned given program label and program information label.

15. The method of claim 14 comprising the step of extracting at least a portion of the program information labels from the broadcast programs.

35 16. The method of claim 15 comprising the step of extracting the program information label from a vertical blanking interval of broadcast television signals.

1        17. The method of claim 14 wherein the program information label is Video  
Program System (VPS) code.

5        18. The method of claim 14 wherein the step of comparing comprises the step of  
comparing program names in said broadcast information labels with program names in said  
given program labels.

10        19. The method of claim 18 wherein the step of comparing comprises the step of  
comparing for equality.

15        20. The method of claim 14 wherein a table comprising the given program labels  
and the corresponding compressed code channel numbers are stored in association in a  
memory and the step of comparing comprises the step of comparing such given program  
labels with broadcasted program information labels derived from the table and the step of  
storing comprises the step of storing such actual channel numbers in association with such  
compressed code channel numbers in the table.

20        21. A controller characterized for using compressed codes for enabling a channel  
tuner to select the proper one of plural actual channels and for control of a recorder to record  
programs broadcast over such channels, where the broadcast programs and associated  
program information labels are broadcast at various times, and  
              wherein each compressed code incorporates the data represented in a set of  
              individual channel numbers, start time, and program length values, wherein each of the  
              compressed codes has a length that is shorter than the length of the concatenation of the  
              individual channel number, start time, and program length values represented by the  
              individual compressed codes,  
              the controller being adapted for channel mapping for forming a correlation  
              between the channel number represented by each said compressed code and the actual  
              channel to be selected by the controller for recording, the controller comprising  
30        an actual channel number of generator for forming a plurality of actual channel  
              numbers each corresponding to one of the actual channels to thereby cause selection by the  
              tuner of the actual channels which correspond to the formed channel numbers;  
              a comparator for comparing, for a predetermined relation, for at least a portion  
              of the broadcast program information label from each of such selected channels from the  
              tuner with plural given program labels, each said given program label having a different  
              corresponding said compressed code channel number; and  
              a memory for storing a correlation between each said compressed code channel  
              number, having a corresponding said given program label, and the actual channel number for

1        an enabled actual channel from which one said broadcast program information label is obtained when the predetermined relation is found between the last mentioned given label and program information label.

5        22.      The controller of claim 21 comprising an extractor for extracting at least a portion of the program information labels from the broadcast programs.

10        23.      The controller of claim 21 comprising an extractor for extracting the program information label from a vertical blanking interval of broadcast television signals.

15        24.      The controller of claim 21 wherein the program information label is a Video Program System (VPS) code.

20        25.      The controller of claim 21 wherein the comparator compares program names in said broadcast information labels with program names in said given program labels.

25        26.      The controller of claim 25 wherein the comparator compares for equality.

30        27.      The controller of claim 21 wherein a table comprising the given program labels and the corresponding compressed code channel numbers are stored in association in a memory and the comparator compares such given program labels derived from the table with the broadcasted program information labels and the memory stores such actual channel numbers in association with such compressed code channel numbers located in the table.

35        28.      A method for forming a channel map for a controller for enabling recording of a broadcasted program that includes a program information label, the method comprising steps of:

- (a)     selecting from one of a plurality of broadcast channels, each having a unique broadcast channel number, a broadcast channel for receiving one of the programs;
- (b)     receiving one of the programs broadcasted on the selected broadcast channel;
- (c)     extracting at least a portion of the program information label from the received program;
- (d)     determining a broadcast channel number contained in the at least a portion of the program information label;
- (e)     looking up in a code channel table a corresponding code channel number for the broadcast channel name;

- (f) making a correlation between the corresponding code channel number and the broadcast channel number for the selected broadcast channel; and
- (g) storing the correlation in a correlation table to thereby from a channel map.

29. The method of claim 28 comprising the additional step (h) of repeating steps (a) to (g) a plurality of times.

30. The method of claim 28 comprising the additional step (h) of repeating steps (a) to (g) until a correlation is made between the broadcast channel number for each broadcast channel and a corresponding code channel number.

31. The method of claim 28 wherein the broadcast program is broadcast in the Video Program System (VPS), and wherein the program information label is a VPS code.

32. The method of claim 28 wherein the program information label is transmitted during the vertical blanking interval of video signals.

33. A system for recording a broadcasted program the system comprising:  
means for inputting a compressed code, the compressed code incorporating the  
data represented in a set of individual channel, date, start time, and program length values,  
wherein the compressed code has a length that is shorter than the length of the concatenation  
of the individual channel, date, start time, and program length values represented by the  
compressed code;

means for receiving the broadcasted program, the program including a program information label

means for extracting at least a portion of the program information label from the program.

means for determining whether a predetermined relation exists between the compressed code and the at least a portion of the program information label;

means for recording broadcasted programs;

means for deactivating the recording means to cause the recording to be recorder;

means responsive to the determining means for enabling at least one of the terminating means for terminating the recording means to enter the recording mode.

means responsive to the determining means for activating at least one of the means for activating and the means for deactivating.

1        34. The system of claim 33 wherein the compressed code comprises one or more alphanumeric characters.

5        35. The system of claim 33 wherein the inputting means comprises a keyboard.

10       36. The system of claim 33 wherein the determining means comprises means for converting the compressed code to first individual channel, date, start time, and program length values, and the at least a portion of the program information label to second individual channel, date and start time values.

15       37. The system of claim 36 wherein the determining means determines whether a predetermined relation exists between the first individual start time value and the second individual start time value.

20       38. The system of claim 37 wherein the program information label is comprised of a plurality of groups of bits of data, a first group identifying the program day, a second group identifying the program month, a third group identifying the program hour, a fourth group identifying the program minute, a fifth group identifying the program country, and a sixth group identifying the program channel.

25       39. The system of claim 38 wherein the means for converting converts the first, second, third, fourth, and sixth groups of bits of data in the program information label to the second individual channel, date, and start time values.

30       40. The system of claim 33 wherein the program information label is transmitted during the vertical blanking interval of video signals.

35       41. The system of claim 36 wherein the determining means determines whether the predetermined relation exists between the compressed code and the at least a portion of the program information label at a predetermined time prior to the first individual start time.

40       42. The system of claim 41 wherein the predetermined time is at least five minutes.

45       43. The system of claim 33 wherein the program information label is the Video Program System (VPS) code.

1           44. A controller for operating a recorder, the controller comprising:  
means for inputting a compressed code, the compressed code incorporating the  
data represented in a set of individual channel, date, start time, and program length values  
represented by the compressed code;  
5           means for receiving a broadcasted program, the program including a program  
information label;  
              means for extracting at least a portion of the program information label from  
the broadcasted program;  
              means for determining whether a predetermined relation exists between the  
10          compressed code and the at least a portion of the program information label;  
              means for activating the recorder to cause the broadcasted program to be  
recorded;  
              means for deactivating the recorder to cause the recording to terminate; and  
              means responsive to the determining means for enabling at least one of the  
15          means for activating and the means for deactivating.

45. The controller of claim 44 wherein the compressed code comprises one or  
more alphanumeric characters.

20          46. The controller of claim 44 wherein the inputting means comprises a keyboard.

47. The controller of claim 44 wherein the controller is a hand-held controller  
separate from the recorder.

25          48. The controller of claim 44 wherein the controller is within the recorder.

49. The controller of claim 44 comprising a decoder for decoding and expanding  
the compressed code to individual channel, date, start time, and program length values.

30          50. The controller of claim 49 wherein the program information label comprises  
individual channel, date, and start time values and the at least a portion of the program  
information label comprises the start time values.

35          51. The controller of claim 50 wherein the determining means determines whether  
a predetermined relation exists between the start time value decoded from the compressed  
code and the start time value from the program information label.

1        52. The controller of claim 44 wherein the program information label is comprised  
of a plurality of groups of bits of data, a first group identifying the program day, a second  
group identifying the program month, a third group identifying the program hour, a fourth  
group identifying the program minute, a fifth group identifying the program country, and a  
5        sixth group identifying the program channel.

10        53. The controller of claim 52 wherein the extracting means converts the first,  
second, third, fourth, and sixth groups of bits of data in the program information label to  
individual channel, date, and start time values.

15        54. The controller of claim 44 wherein the program information label is  
transmitted during a vertical blanking interval of television signals.

15        55. The controller of claim 51 wherein the determining means is adapted to  
determine whether the start time value from the program information label represents a  
predetermined amount of time prior to the start time value decoded from the compressed  
code.

20        56. The controller of claim 55 wherein the predetermined amount of time is at  
least five minutes.

25        57. The controller of claim 44 wherein the program information label is a Video  
Program System (VPS) code.

25        58. A method for recording a broadcasted program, the method comprising steps  
of:

30        inputting a compressed code, the compressed code incorporating the data  
represented in a set of individual channel, date, start time, and program length values,  
wherein the compressed code has a length that is shorter than the length of the concatenation  
of the individual channel, date, start time, and program length values represented by the  
compressed code;

35        receiving the broadcasted program, the program including a program  
information label;

              extracting the program information label from the program;

              determining whether a predetermined relation exists between the compressed  
code and the program information label;

              activating a recorder to record the program when the predetermined relation  
exists between the compressed code and the program information label; and

1                   deactivating the recorder when the predetermined relation does not exist  
between the compressed code and the program information label.

5                   59.    The method of claim 58 wherein the step of inputting comprises inputting a  
compressed code having one or more alphanumeric characters.

60.    The method of claim 58 wherein the step of inputting comprises using a  
keyboard for inputting the compressed code.

10                  61.    The method of claim 58 comprising the step of performing the steps on a  
hand-held controller separate from the recorder.

15                  62.    The method of claim 58 comprising the step of performing the steps on a  
controller within the recorder.

16                  63.    The method of claim 58 comprising the step of decoding and expanding the  
compressed code to individual channel, date, start time and program length values.

20                  64.    The method of claim 63 wherein the program information label comprises  
individual channel, date and start time values, and the step of determining comprises the step  
of determining whether a predetermined relation exist between the individual start time value  
decoded from the compressed code, and the individual start time value from the program  
information label.

25                  65.    The method of claim 55 wherein the step of extracting the program  
information label comprises extracting from a Video Program System (VPS) code.

30                  66.    The method of claim 65 wherein the step of extracting from the VPS code  
comprises step of extracting a plurality of groups of bits of data, a first group identifying the  
program day, a second group identifying the program month, a fourth group identifying the  
program minute, a fifth group identifying the program country, and a sixth group identifying  
the program channel.

35                  67.    The method of claim 66 wherein the converting step comprises the step of  
converting the first, second, third, fourth, and sixth groups of bits of data in the VPS code  
to the individual channel, date, and start time values.

1        68. The method of claim 58 wherein the determining step comprises the step of  
determining whether the individual start time value from the program information label  
represents at least a predetermined amount of time prior to the individual start time value  
decoded from the compressed code.

5

69. A controller for operating a recorder, the controller comprising:  
means for inputting a compressed code, the compressed code incorporating the  
data represented in a set of individual channel, date, start time, and program length values,  
wherein the compressed code has a length that is shorter than the length of the concatenation  
of the individual channel, date, start time, and program length values represented by the  
compressed code;  
a receiver for receiving a broadcasted program the program including a  
program information label;  
means for decoding and expanding the compressed code to individual channel,  
date, start time and program length values;  
an extractor for extracting at least a portion of the program information label  
from the broadcasted program;  
means for determining whether a predetermined relation exists between at least  
a portion of the decoded values and the at least a portion of the program information label;  
means for activating the recorder to cause the broadcasted program to be  
recorded;  
means for deactivating the recorder to cause the recording to terminate; and  
means responsive to the determining means for enabling at least one of the  
means for activating and the means for deactivating.

25

70. The controller of claim 69 comprising means for enabling a tuner in the  
recorder to select a channel of broadcast signals corresponding to the individual channel value  
decoded from the compressed code.

30

71. The controller of claim 69 wherein the compressed code comprises one or  
more alphanumeric characters.

72. The controller of claim 69 wherein the inputting means comprises a keyboard.

35

73. The controller of claim 69 wherein the controller is a hand-held controller  
separate from the recorder.

74. The controller of claim 69 wherein the controller is within the recorder.

1        75. A method for control of a channel selector to select the proper channels and  
for control of a recorder to record broadcast programs on such channels where the programs  
and associated program information labels are broadcast at various times over a plurality of  
broadcast channels, the method comprising:

5            receiving an input comprising compressed codes, each said compressed code  
incorporating the data represented in a set of individual channel, start time, and program  
length values, wherein each of the compressed codes has a length that is shorter than the  
length of the concatenation of the individual channel, start time, and program length values  
represented by the compressed code;

10          decoding and expanding each of the received compressed codes into at least  
individual channel and start time values;

15          enabling the channel selector to select broadcasted programs from the channel  
corresponding to the individual channel value;

15          determining whether a predetermined relation exists between at least one value  
represented by one of the received compressed codes and at least a portion of one of said  
program information labels which is broadcasted; and

20          upon such determination enabling at least one of the steps of enabling the  
recorder to record a selected broadcasted program and deactivating the recorder to thereby  
cause recording of a selected broadcasted program to terminate.

20        76. The method of claim 75 wherein the step of receiving compressed codes  
comprises the step of receiving one or more alphanumeric characters.

25        77. The method of claim 75 wherein the step of receiving comprise the step of  
inputting the compressed code through a keyboard.

30        78. The method of claim 75 comprising the step of performing the recited steps  
on a hand-held controller separate from the recorder.

30        79. The method of claim 75 comprising the step of performing the recited steps  
in the recorder.

35        80. The method of claim 78 comprising the step of decoding and expanding the  
compressed codes to individual channel, date, start time, and program length values.

35        81. The method of claim 80 wherein the program information label represents a  
start time value and the at least a portion of one of the program information labels comprises

1        a start time value and the step of determining comprising the step of comparing such start time.

5        82.      The method of claim 81 wherein the step of comparing determines whether a predetermined relation exists between the start time value decoded from one of the compressed codes and the start time value represented by one of the program information labels.

10        83.      The method of claim 75 wherein the program information label comprises a plurality of groups of bits of data, a first group identifying the program day, a second group identifying the program month, a third group identifying the program hour, a fourth group identifying the program minute, a fifth group identifying the program country, and a sixth group identifying the program channel.

15        84.      The method of claim 75 comprising the step extracting at least a portion of the program information label from the broadcast program.

20        85.      The method of claim 84 comprising the step of extracting the program information label from a vertical blanking interval of broadcast television signals.

25        86.      The method of claim 82 comprising the step of causing the step of enabling the channel selector to select a predetermined amount of time prior to the time indicated by one of the start time values decoded from the compressed codes.

30        87.      The method of claim 86 wherein the predetermined amount of time is at least five minutes.

35        88.      The method of claim 75 wherein the program information label is a Video Program System (VPS) code.

89.      A controller for enabling a channel selector to select the proper channels and for control of a recorder to record programs broadcast on such channels where the programs and associated program information labels are broadcast at various times over a plurality of broadcast channels, the controller comprising:  
an input for receiving compressed codes, each said compressed code incorporating the data represented in a set of individual channel, start time, and program length values, wherein each of the compressed codes has a length that is shorter than the

1 length of the concatenation of the individual channel, start time, and program length values  
represented by the compressed code;

2 a decoder for expanding the received compressed codes into at least individual  
channel and start time values;

5 means for enabling the channel selector to select broadcast programs from the  
channel corresponding to the individual channel value which is from one or said compressed  
codes;

10 means for determining whether a predetermined relation exists between at least  
one said value represented by one of the received compressed codes and at least a portion  
of one of said broadcast program information labels; and

15 means operative upon such determination for either enabling the recorder for  
recording to thereby cause recording of at least one of the selected broadcasted programs  
deactivating of the recorder to thereby cause recording of the selected broadcasted programs  
to terminate.

15

90. The controller of claim 89 wherein the compressed codes each comprise one  
or more alphanumeric characters.

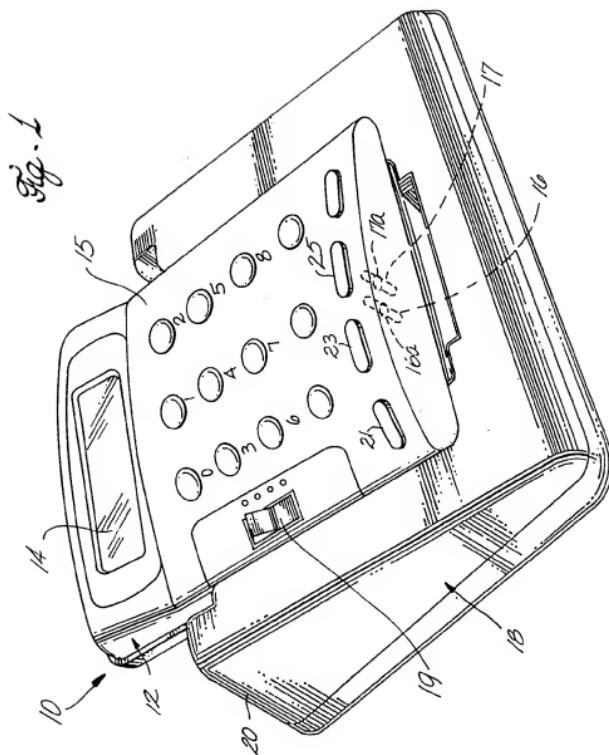
20

91. The controller of claim 89 wherein the input comprises a keyboard.

25

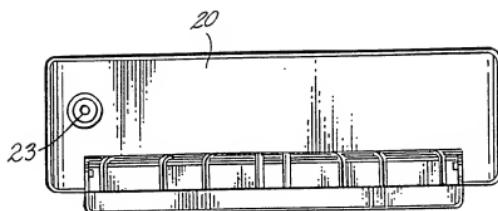
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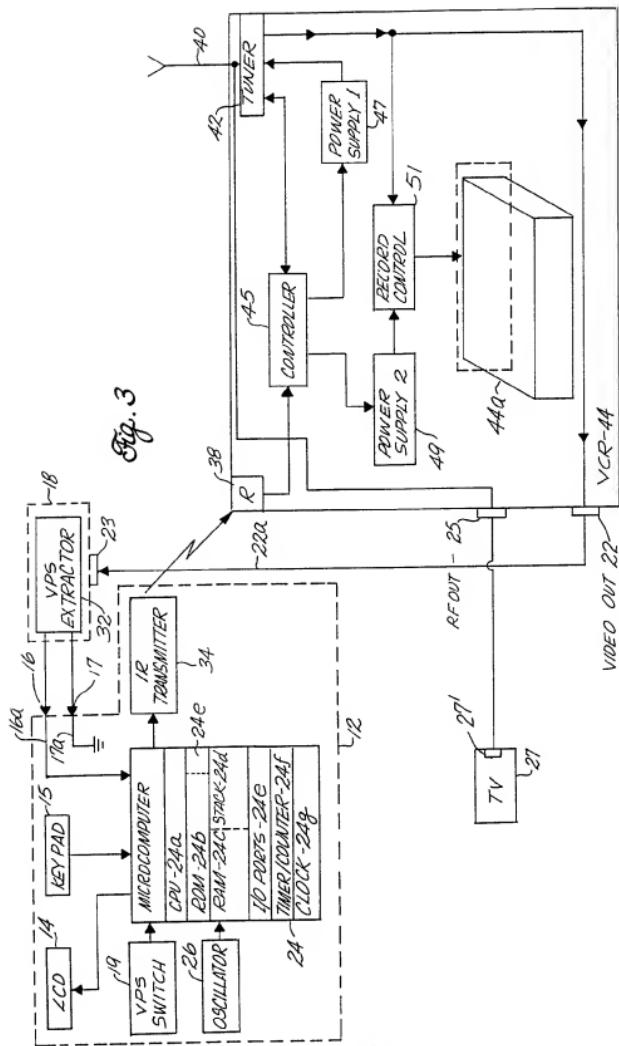
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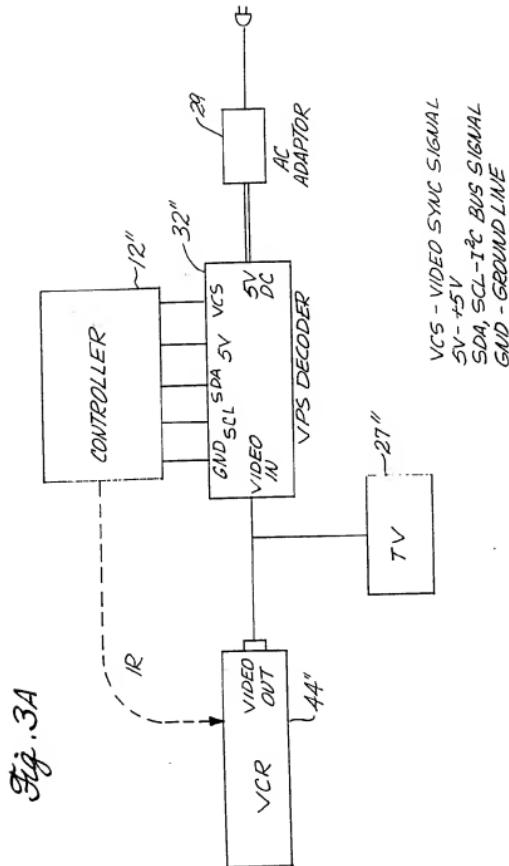


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*Fig. 2*





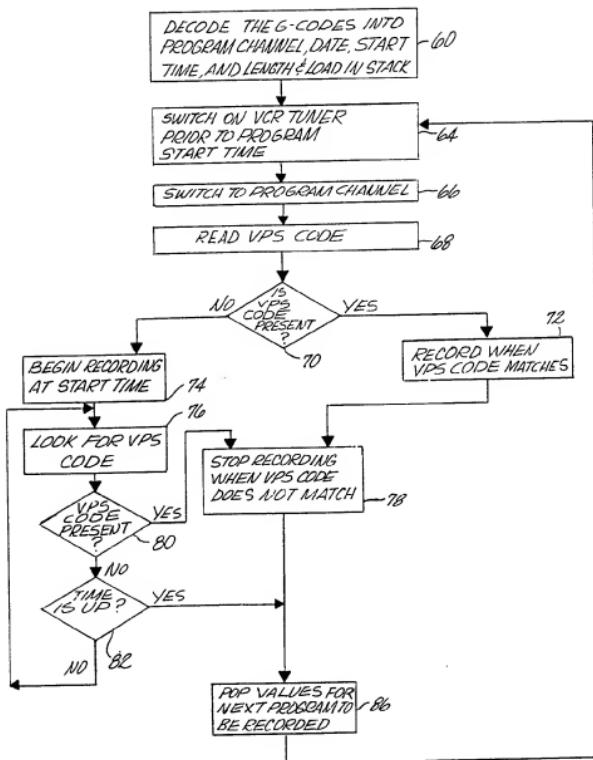
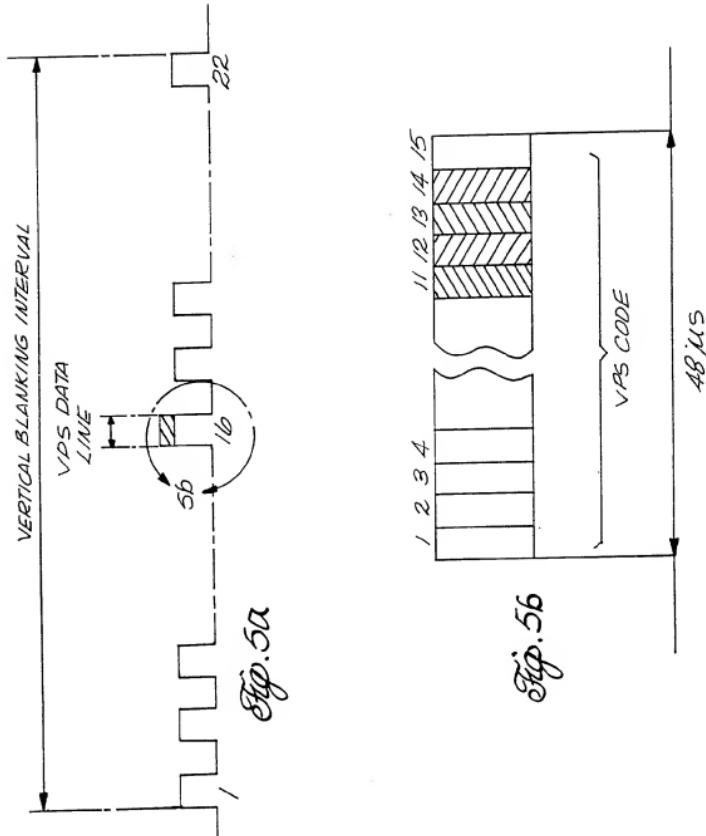


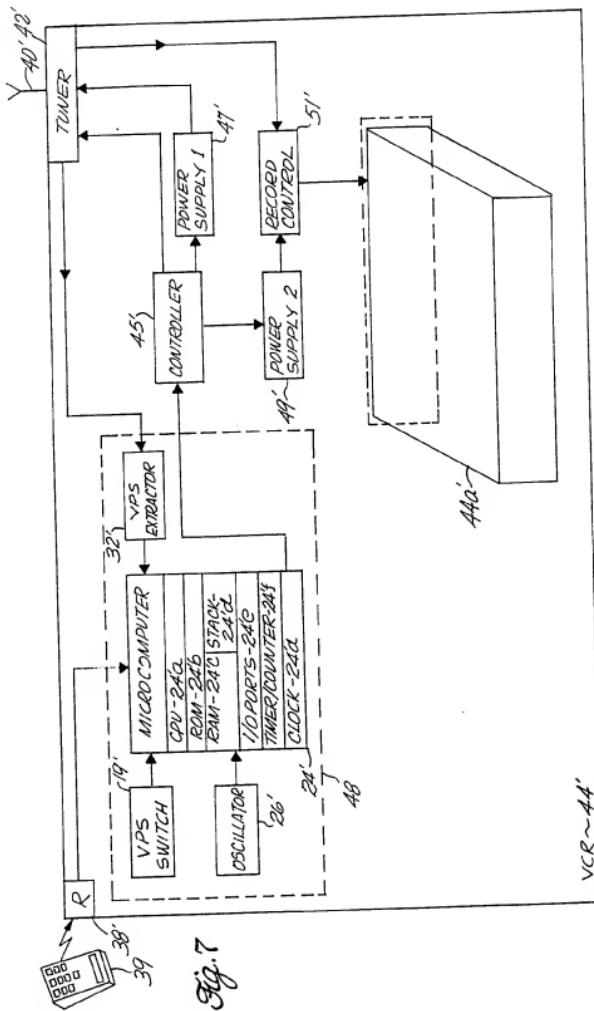
Fig. 4



7 / 1 2

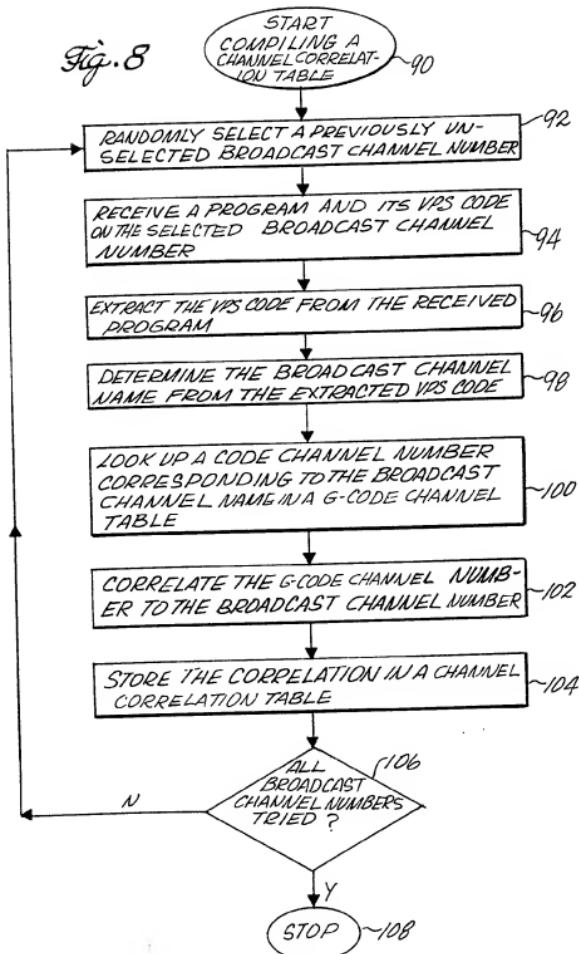
Fig. 6

VPS CODE WORD NO.		11		12		13		14	
VPS	BIT NO.	0	1	2	3	4	5	6	7
		8	9	10	11	12	13	14	15
		16	17	18	19	20	21	22	23
		24	25	26	27	28	29	30	31
A P D A R G E E S		DAY		MONTH		HOUR		MINUTE	
								COUNTRY PROGRAM CHANNEL	



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10 / 12

*Fig. 9*

TABLE - 110

NAME	G-CODE CHANNEL NO.	ACTUAL CHANNEL NO.
ABC	7	10
NBC	4	39
⋮	⋮	⋮

Fig. 10

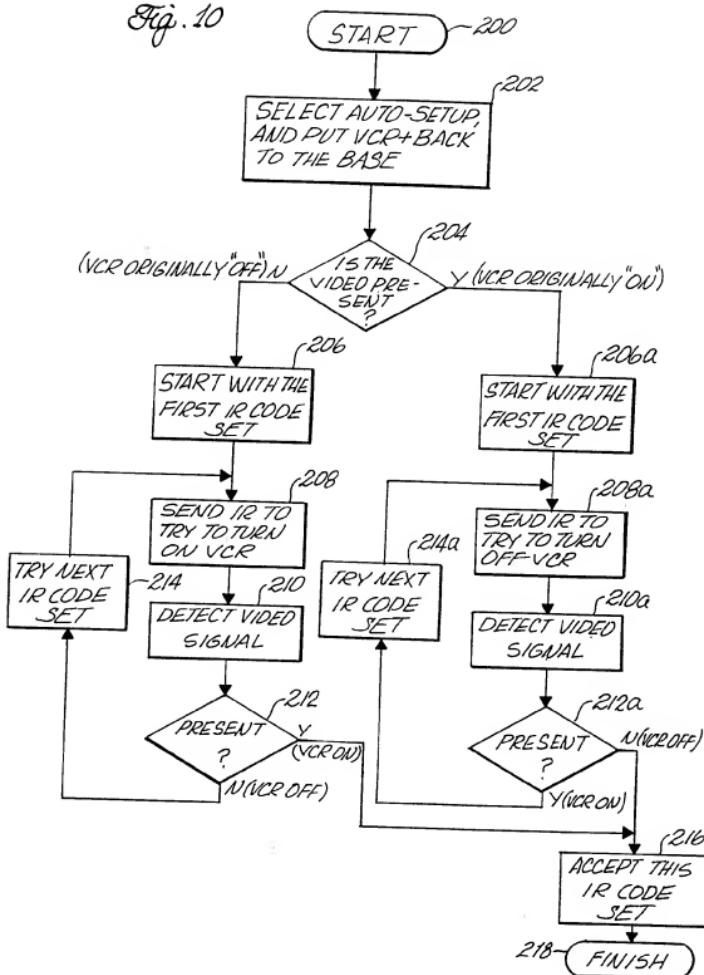
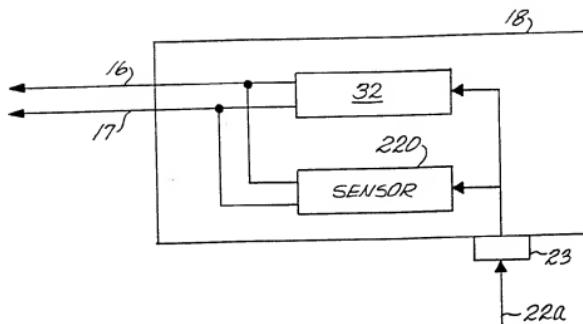


Fig. 11





## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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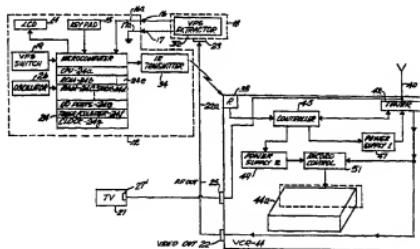
08/440,189	12 May 1995 (12.05.95)	US
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08/440,191	12 May 1995 (12.05.95)	US

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(74) Agent: MONROE, Wesley, W.; Christie, Parker &amp; Hale, P.O. Box 7068, Pasadena, CA 91109-7068 (US).

(54) Title: VPS COMPATIBLE APPARATUS AND METHOD USING COMPRESSED CODES FOR IR CODE SELECTION



## (57) Abstract

An embodiment of the present invention is a method for programming a controller for selection, from a plurality of set of infrared (IR) codes, set of IR codes for subsequent control of IR signal communication with a video cassette recorder (VCR). Each set of IR codes is for communicating with a different corresponding VCR. To this end, each such VCR has a tuner, which, when tuned to an actual channel of broadcast video signals, provides video signals derived from the actual channel to a video output thereof. A signal is provided to the VCR where the signal is predetermined by a selected IR code which is selected from one of the sets of IR codes. This causes the VCR to perform a predetermined operation. The video output of the VCR is monitored for a predetermined signal condition, such as a video signal being present, or for a label broadcast in the video signals. A set of IR codes is then selected for subsequent signal communication with the VCR. The set of IR codes which is selected is the one from which the selected IR code is selected which results in the predetermined signal condition.

(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, ARIP0 patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

## Published

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## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 96/06908A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 H04N5/782

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO,A,93 12612 (YUEN ET AL.) 24 June 1993 see page 28, line 30 - page 30, line 20	1,7,13
A	& US,A,5 307 173 cited in the application ---	
A	WO,A,94 28676 (MANKOVITZ ET AL.) 8 December 1994 see page 43, line 30 - page 48, line 5; figures 29-35 ---	13
A	WO,A,95 11568 (MANKOVITZ) 27 April 1995 see page 9, line 1 - page 11, line 18; figures 1A,2A,2B ---	1,7,13
	---	-/-

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

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Date of the actual completion of the international search  19 December 1996	Date of mailing of the international search report  30.12.96
Name and mailing address of the ISA  European Patent Office, P.B. 5818 Patentstaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+ 31-70) 340-306	Authorized officer  Verleye, J

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 96/06908

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP,A,0 577 283 (SONY CORPORATION) 5 January 1994 see the whole document	14-32
Y		38,39, 47,52, 53,61, 66,67, 73,78, 80,81,83 33-37, 40, 43-46, 48-50, 54, 57-60, 62-65, 69-72, 74-77, 79,84, 85,88-91
A		---
X	EP,A,0 589 369 (SANYO ELECTRIC CO., LTD) 30 March 1994	33-37, 40, 43-46, 48-50, 54, 57-60, 62-64, 69-72, 74-77, 79,84, 85,88-91
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A	see the whole document	---
2		33-40, 43-50, 52-54, 57-64, 66,67, 69, 71-81, 83-85, 88-91
		-----

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 96/06908

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:
2.  Claims Nos.: because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3.  Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see extra sheet

1.  As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3.  As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4.  No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

**INTERNATIONAL SEARCH REPORT**

International Application No. PCT/US 96/06908

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/210**

1. claims 1-13: programming a controller for selection of infra red codes
2. claims 14-32: channel mapping of a video cassette recorder controller
3. claims 33-91: programming of a video cassette recorder controller

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 96/06908

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